

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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WT Docket No. 96-86
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)
)
The Development of Operational,)
Technical, and Spectrum Requirements)
For Meeting Federal, State and Local)
Public Safety Agency Communication)
Requirements Through the Year 2010)
)
Establishment of Rules and Requirements)
For Priority Access Service)

REPLY COMMENTS OF MOTOROLA TO THE SECOND NPRM

Motorola hereby replies to the comments submitted in response to the Commission's Second Notice of Proposed Rulemaking in the above-captioned docket ("*Second NPRM*"). In general, the opening round comments provide the FCC with a solid consensus on how best to utilize the 746-806 MHz frequency band to solve the real world communications needs of the public safety community. The FCC should move quickly to adopt rules based on this consensus so that manufacturers can complete their product design processes in order to begin serving public safety users as quickly as possible after the commencement of licensing mandated to begin on September 1, 1998.

I. Interoperability

One of the principal proposals of the *Second NPRM* was to devote a significant portion of the 24 MHz public safety allocation for interoperability purposes. The FCC's intent was to address many of the problems associated with the existing "balkanized" public safety frequency allocations that have affected the ability of public safety service providers to effectively inter-communicate while responding to the same emergency or situation.¹

¹ *Second NPRM* at 13.

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In its opening comments, Motorola disagreed with this approach and argued against designating a significant portion of the band for interoperability purposes. Citing the Final Report of the PSWAC committee, Motorola noted that the interoperability problems experienced between users operating in the numerous public safety frequency allocations cannot be achieved by designating a single band as a "one size fits all" solution.² Instead, Motorola agreed with the PSWAC Final Report that the real need is for the FCC and the NTIA to designate at least 2.5 MHz of spectrum below 512 MHz to solve the interoperability needs of users operating in the VHF and lower UHF bands.³ Motorola did recommend, however, that the FCC designate a reasonable number of additional national mutual aid channels (*e.g.* 10) in the 746-806 MHz band to be used in conjunction with the existing 800 MHz mutual aid channels to provide interoperability among users in these frequency bands.

Numerous representatives of the public safety user community echoed Motorola's views. APCO, for example, stated that the Commission's approach "overestimates" interoperability spectrum requirements for 800 MHz systems and "strongly disagrees" with the FCC's apparent view that the new 746-806 MHz band be available principally for interoperable communications.⁴ Likewise, the National Public Safety Telecommunications Council (NPSTC) stated that, contrary to the FCC's proposals, an appropriate interoperability band "must be located in spectrum below 512 MHz."⁵ Arguing that the Commission's proposals for interoperability exceeds public safety actual requirements, the California Chapter of APCO stated that "if spectrum from UHF-TV channels 60-69 is allocated for interoperability, the allocation should not exceed 10 voice channels and two high speed data channels."⁶ The State of

² Motorola Comments at 3.

³ *Id.*

⁴ Comments of APCO at 10.

⁵ Comments of NPSTC at 9.

⁶ California Public-Safety Radio Association A Chapter of APCO at 2.

Florida concurs that “the number of channels in this band [designated for voice interoperability] should be less” than the values specified in the *Second NPRM*.⁷ Ericsson noted that it is “not persuaded that the Commission is correct that ‘most’ of the 24 MHz of spectrum in the 746-806 MHz band should be used for interoperability.”⁸

These and other commenters recommend that the FCC adhere to the recommendations of the PSWAC report and endeavor to define interoperability options in spectrum below 512 MHz. As pointed out by NPSTC, many public safety agencies (including almost all law enforcement in the New York and Los Angeles metropolitan areas) are currently operating in bands below 512 MHz and this is where the greatest need for additional interoperability is needed. In this regard, Motorola notes the comments filed by the Federal Law Enforcement Wireless Users Group (FLEWUG) who identify the potential availability of the 138-144 MHz band on a shared coordinated basis with existing federal users. Motorola believes that this could offer an ideal interoperability solution for VHF and lower UHF users and urges the FCC and the NTIA to immediately pursue this matter.

Although Motorola appreciates the efforts of the FCC to help solve the interoperability problem, relegating the 746-806 MHz band principally for interoperability will not provide immediate benefits to users below 512 MHz and will also reduce the ability of this band to alleviate the existing shortage of channels for day-to-day operations. Indeed, the Commission should recall that PSWAC identified a total spectrum need of 97.5 MHz for public safety by the year 2010. The 24 MHz of spectrum received in this allocation is barely sufficient to satisfy near term needs in some markets as its immediate availability will be significantly compromised by the continued need to share the spectrum with broadcast facilities. Designating the band solely

⁷ State of Florida at 2.

⁸ Comments of Ericsson at 3.

for interoperability purposes will further reduce its effectiveness. Thus, the Commission should reject its earlier approach and instead designate a small number of channels for mutual aid.⁹

In a related matter, Motorola supports the comments of Ericsson, NPSTC, APCO, and the Project 25 Steering Committee as well as other commenters who support establishing analog FM modulation (25 kHz and 12.5 kHz) as the baseline technology for interoperability.¹⁰ Motorola agrees with Ericsson and NPSTC that analog FM technology will provide a low cost interoperability solution to the widest segment of public safety users.

However, it is also imperative that the FCC support the public safety community's effort to promote interoperability and a competitive equipment marketplace by adopting the Project 25 suite of standards as the digital baseline for interoperability in the 746-806 MHz band. While the analog baseline standard would facilitate immediate interoperability with public safety users in the 821-824/866-869 MHz band, Motorola expects that the vast majority of systems deployed in the new band will contain digital capabilities. The Project 25 standard is the most appropriate digital interoperability standard to recommend for public safety users. As noted by APCO, nearly three quarters of a million man-hours have been devoted to tailoring these specifications for US based public safety systems. Supervised by the Telecommunications Industry

⁹ Commenters generally agree that the FCC should mandate all public safety radios in the 746-806 MHz band to incorporate any new mutual aid channels using the baseline interoperability mode as recommended by PSWAC. Motorola also continues to support an FCC requirement that 746-806 MHz public safety radios be required to incorporate the existing mutual aid channels in the 821-824/866-869 MHz band. While Ericsson notes that it would be technically feasible to add these channels into the 746-806 MHz radios, it also expresses concerns about increased manufacturing costs. Motorola believes that one of the primary benefits of the 746-806 MHz band for public safety is its proximity to existing 800 MHz public safety allocations allowing for greater interoperability between the bands. Manufacturers should take advantage of this benefit at the outset when costs can be minimized. In so doing, we can promote greater interoperability between the two bands than has been previously achieved in other public safety allocations.

¹⁰ Motorola takes this opportunity to clarify that in its proposed band plan for the 746-806 MHz public safety band, it specified basic channeling blocks of 6.25 kHz for voice systems. Motorola supports providing the ability to aggregate 6.25 kHz channels to form 12.5 kHz or 25 kHz blocks consistent with the technological design of the radio system.

Association, the overall standards setting process has been fair and open to the entirety of public safety users and equipment manufacturers. The technology is offered by multiple vendors at competitive prices as compared to other commercially available digital products. Given the need to adopt a digital interoperability standard, the Project 25 standards are clearly the most effective for promoting immediate results.

Finally, Motorola notes that several organizations filed comments supporting the adoption of receiver standards to promote even more efficient spectrum usage. Motorola believes that there is no need for the FCC to adopt receiver standards for either interoperability operations or general use systems. While receiver standards are appropriate where a common transmission scheme exists, the 746-806 MHz band will be home to a diverse number of technologies, many of which are in the nascent stages of development. In addition, the 746-806 MHz band will remain populated by both high power and low power broadcast operations. To the extent necessary, the FCC should encourage standards development on a voluntary basis in TIA that will be more responsive to evolving technologies in this dynamic environment. In this context, Motorola notes that the TIA recently agreed to review, update, and/or develop receiver standards appropriate to the needs of public safety users including elements and issues noted above.

II. Land Mobile and Television Broadcast Sharing Criteria

Noting that public safety users will be required to co-exist with both adjacent channel and co-channel broadcast stations for the foreseeable future, *the Second NPRM* sought comment on the appropriate sharing criteria that could both adequately protect television stations and promote more intensive use of the spectrum by public safety. In its comments, Motorola submitted a technical response demonstrating that the proposal to reduce broadcast station co-channel protection from 50 dB to 40 dB would not increase interference potential given the overall conservative nature of the original analysis performed in 1970 as well as the propagation

differences between 470 MHz and 746 MHz. Likewise, Ericsson and NPSTC offered similar comments noting improvements in television receiver design and the successful experience of existing land mobile and television sharing operations that are based on 40 dB protection.

The Association of Maximum Service Television (AMST) and the National Association of Broadcasters (NAB) filed joint comments arguing that the FCC should not modify the existing sharing rules that are currently used for operations in the 470-512 MHz band. Essentially, AMST and the NAB state that the existing criteria have worked well to promote opportunities for land mobile use of broadcast spectrum and that the broadcast service should not be subjected to any additional interference risk.¹¹

Motorola agrees with AMST and the NAB that the existing environment at 470-512 MHz demonstrates the sharing capability of the two services. The spectrum allocated to the land mobile services in the 11 markets where sharing is available is intensely used and desired for all types of wireless communications, both public safety and commercial operations. Based on this past success, Motorola recommends that the FCC review whether further sharing can be promoted across the remaining portions of the UHF-TV band now that the DTV allotment process is nearly complete in order to provide additional relief for congested mobile services and to promote more efficient use of the broadcast spectrum.

The comments of AMST and the NAB, however, lack any technical analysis to support their position of maintaining the status quo on interference protection levels. In contrast, Motorola and Ericsson have showed that there is approximately 5 dB difference in propagation characteristics between the existing shared band at 470-512 MHz band and the 746-806 MHz band currently under discussion. Also, considering the effects of antenna directionality (approximately 15 to 20 dB for front to back discrimination) and television receiver improvements, it becomes clear that reducing the co-channel protection ratio from 50 dB to 40

¹¹ Comments of AMST and NAB at 4.

dB remains a conservative action that will ensure continued real world protection to potentially affected broadcast stations. As noted by the AMST and the NAB, existing assignments based on this standard are currently performing in the New York/New Jersey area with significant success and a lack of complaints.

The broadcast parties also state that there is insufficient data on which to base protection levels for digital television and that a committee should be established to develop appropriate protection levels. In Motorola's view, protecting digital stations at the same levels as analog is another conservative standard that will minimize any risk of new interference. Indeed, this approach was used in part to develop the DTV allotment plan for markets containing land mobile allocations in the 470-512 MHz band. It is difficult to understand why the FCC now needs an industry committee to assess land mobile/DTV sharing criteria when the necessary assumptions have already been made for the lower portions of the UHF-TV band. Given the more robust quality of the DTV signal, the FCC should be confident that the analog protection levels will provide adequate levels of interference protection to DTV stations and should therefore reject any additional calls for time-consuming committees.

Finally, AMST and NAB offer a technical report prepared by Fox Ridge Communications that discusses how the public safety community can make more efficient use of their spectrum in order to reduce the likelihood that it will soon return to the FCC in search of additional spectrum. Some of the options suggested by the Fox Ridge report include: 1) a licensee could not access new spectrum until equipment operating in existing spectrum meets a 6.25 kHz bandwidth equivalent standard; 2) a licensee would have to turn in existing spectrum before being licensed in new spectrum, and then licensing would be for only 6.25 kHz equivalent technology; and 3) a licensee would have to convert to a 6.25 kHz equivalent bandwidth equipment on a stated date.

It appears that the broadcast community is promoting a technology migration path for the nation's financially-strapped public safety community that they themselves have fought against in their own DTV migration. Indeed, many of the deployment issues associated with public

safety use of the 746-806 MHz band are a direct result of the broadcasters refusing to support a date certain transition to DTV.

Motorola points out that the spectrum, operational and transition needs of the public safety community were thoroughly discussed and reported by the PSWAC committee. As this was an open forum, the broadcast parties had ample opportunity to bring forth their proposed recommendations to that committee.

III. Harmonic Interference to GNSS Receivers

Several commenters addressed the need for the FCC to develop technical standards to ensure that harmonic emissions from public safety radios in the 746-806 MHz band do not interfere with the Global Navigation Satellite System (GNSS) including the US Global Positioning System (GPS) and the Russian Federal Global Navigation Satellite System (GLONASS). The FAA stated that it looks forward to working with the FCC to develop appropriate out of band limits and cites a RTCA document DO-235 as specifying -70 dBW/MHz for wideband mobile signals and -80 dBW for CW signals.¹² The US GPS Industry Council also pledged to participate in any further study but notes that the current Part 90 emission mask and permissible transmitter power would yield spurious emissions in the band 1559-1610 MHz in the range -42 to -50 dBW for mobile units and -35 to -43 dBW for the base stations. According to the Council, such levels would interfere with GPS operations.¹³

Motorola has reviewed this issue and believes the time is ripe for the FCC to initiate a forum between the affected industries so that technical standards can be adopted without delay. The sooner that reasonable standards can be established, the sooner that manufacturers can provide compliant products to the public safety community. Motorola therefore recommends

¹² Comments of the FAA at 2.

¹³ Comments of the US GPS Industry Council at 4, 5.

that the FCC call together representatives of the aeronautical community and public safety users and manufacturers to discuss the appropriate levels of spurious emission attenuation. Motorola notes, however, that only a small portion of the public safety allocation of UHF-TV channels 63, 64, 68, and 69 is actually impacted by the issue. Thus, there is no need to impose any onerous spurious attenuation requirements on the public safety sub-bands that do not pose any interference risk to either GLONASS or GPS nor should the deployment of systems operating on these sub-bands be delayed pending further discussions of this issue.

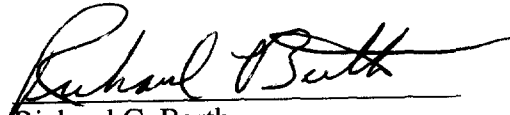
Motorola notes that the aeronautical community references the analyses already completed by the RTCA. While this work appears to form the basis of a technical solution for the compatibility between the GNSS and the mobile satellite services, Motorola notes that the existing efforts have focused on minimizing signal levels into the GNSS from sources operating in approximately the same frequency band. The RTCA has not, however, carefully studied the interference effects of second harmonic emissions and whether this type of emission modifies any of the assumptions used in determining the necessary protection to GNSS receivers. The FCC and the NTIA should be aware that requiring public safety land mobile radios to meet the emission levels established by the aeronautical community for the MSS service will most likely result in very significant manufacturing costs that will further drive up the cost for public safety radio equipment. Thus, it is imperative that all industry components fully understand the need and ramifications of this technical standard.

IV. Conclusion

More than two years ago, the Federal government created the Public Safety Wireless Advisory Committee to report on the status of public safety communications systems in the United States. That committee sounded an alarm about a potential crisis that exists in many cities across America unless additional spectrum is provided for public safety users. By moving swiftly, the Commission can allay that crisis and avert any increased threat to the American

people. The record developed in this proceeding, together with the PSWAC Final Report, provide an excellent blueprint for the Commission to decide the remaining issues in expedited fashion.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Richard Barth", written over a horizontal line.

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